

My Notes

Items 1 through 3 show how to use algebra tiles to factor a trinomial. However, drawing tiles to factor a trinomial can become time-consuming. Analyzing patterns and using graphic organizers can help factor a trinomial of the form $x^2 + bx + c$ without using tiles.

- 4. Consider the binomials $(x - 5)$ and $(x + 3)$.
 - a. Determine their product.

 - b. How is the coefficient of the trinomial's middle term related to the constant terms of the binomials?

 - c. How is the constant term of the trinomial related to the constant terms of the binomials?

- 5. Consider the binomials $(x + 6)$ and $(x + 1)$.
 - a. Determine their product.

 - b. How is the coefficient of the trinomial's middle term related to the constant terms of the binomials?

 - c. How is the constant term of the trinomial related to the constant terms of the binomials?

- 6. **Express regularity in repeated reasoning.** Use the patterns you observed in Items 4 and 5 to analyze a trinomial of the form $x^2 + bx + c$. Describe how the numbers in the binomial factors are related to the constant term c , and to b , the coefficient of x .

Lesson 27-1 Factoring $x^2 + bx + c$

ACTIVITY 27

continued

Example A

Factor $x^2 + 12x + 32$.

Step 1: Create a graphic organizer as shown. Place the first term in the upper left region. Place the last term in the lower right region.

x^2	
	32

Step 2: Identify the factors of c that add to b . Use a table to help you test factors.

Factors of 32		Sum of the Factors		
32	1	$32 + 1$	=	33
16	2	$16 + 2$	=	18
8	4	$8 + 4$	=	12✓

Step 3: Fill in the missing factors and products in the graphic organizer.

	x	8
x	x^2	$8x$
4	$4x$	32

Step 4: Write the original trinomial as the product of two binomials.

$$x^2 + 12x + 32 = (x + 4)(x + 8)$$

Mv/Notes

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Try These A

- a. Fill in the missing sections of the graphic organizer for the trinomial $x^2 - 6x + 8$. Express the trinomial as a product of two binomials.

x^2	
$-4x$	8

- b. Make a graphic organizer like the one above for the trinomial $x^2 + 14x + 45$. Express the trinomial as a product of two binomials.

- c. Factor $x^2 + 6x - 27$.

- d. Factor $x^2 + 10x + 1$.

MATH TIP

If there are no factors of c that add to b , the trinomial cannot be factored. A polynomial that cannot be factored is called *unfactorable* or a *prime polynomial*.

Lesson 27-1
Factoring $x^2 + bx + c$

ACTIVITY 27

continued

Check Your Understanding

Factor each trinomial. Then multiply your factors to check your work.

- 7. $x^2 + 15x + 56$
- 8. $x^2 + 22x + 120$
- 9. $x^2 + 6x - 27$
- 10. $x^2 - 14x + 48$
- 11. $x^2 - x + 1$

LESSON 27-1 PRACTICE

Factor each trinomial.

- 12. $x^2 + 8x + 15$
- 13. $x^2 - 5x - 14$
- 14. $x^2 - 5x + 3$
- 15. $x^2 - 16x + 48$
- 16. $24 + 10x + x^2$
- 17. Custom Showrooms has expanded and now wants Factor Steele Buildings to create a floor plan with one great room, 15 large offices, and 50 cubicles.
 - a. Write the area of the new floor plan as a trinomial.
 - b. Factor the trinomial.
 - c. Multiply the binomials in Part (b) to check your work.
- 18. **Reason abstractly.** Suppose $x^2 + bx + c$ is a factorable trinomial in which c is a positive prime number.
 - a. Write an expression to represent the value of b .
 - b. Write $x^2 + bx + c$ as the product of two factors using only c as an unknown constant.

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MATH TIP

A prime number has only itself and 1 as factors. For example, the numbers 3 and 11 are prime numbers.